CLEAN DEVELOPMENT MECHANISM
SIMPLIFIED PROJECT DESIGN DOCUMENT
FOR SMALL-SCALE PROJECT ACTIVITIES (SSC-CDM-PDD)
Version 02

CONTENTS

Revision history of this document

Version Number	Date	Description and reason of revision
01	21 January 2003	Initial adoption
02	8 July 2005	• The Board agreed to revise the CDM SSC PDD to reflect guidance and clarifications provided by the Board since version 01 of this document. • As a consequence, the guidelines for completing CDM SSC PDD have been revised accordingly to version 2. The latest version can be found at <http://cdm.unfccc.int/Reference/Documents>.

SECTION A. General description of the small-scale project activity

A.1. Title of the small-scale project activity:

>>
Rick husk based cogeneration plant (5 MW) at Shibzada Ajit Singh Nagar District, Punjab by M/s Nahar Industrial Enterprises limited.

Version 02

Date: 10/02/2007

A.2. Description of the small-scale project activity:

>>
Project Description

Nahar Industrial Enterprises Limited (NIEL) has implemented 5 MW rice husk based cogeneration plant at Jalalpur village, Punjab, India. The cogeneration plant generates 40 TPH of steam with the outlet parameters of 45 $kg/cm^2_{(g)}$, and 420 deg C. The entire steam generated in the boiler is fed to the extraction condensing turbo-generator. The controlled extraction of steam from the turbine is at 8-8.5 $kg/cm^2_{(a)}$ 22 TPH and this steam is sent for process requirement.

The purpose of the project activity is to meet the energy demand of the plant by effective and clean generation of power and steam utilizing the biomass available in the region.

Pre-project Scenario

In the pre-project scenario, the power demand of NIEL process unit was met by Punjab State Electricity Board (PSEB) and steam demand was met by two oil fired boilers (12 TPH, 10.5 kg and 140ºC each).

Post-project Scenario

In the post project scenario, both the power supply from PSEB and the steam generated from oil fired boiler are totally displaced by the cogeneration plant. Out of the two FO based boilers, one would be kept as a standby back up arrangement whereas the other would be shifted as a stand by arrangement for the new coal based captive power plant inside the NIEL industry premises only, the emissions from the same if used would be monitored throughout the crediting period and accounted for as leakage.

Project's contribution to Sustainable Development

The contributions of project activity towards sustainable development are explained with indicators like socio-economy, environment and technology as follows:

1. Socio-economic well being: The project has created a business opportunity during construction phase for local stakeholders such as suppliers, contractors, bankers etc. contributing to economic well-being aspects. Further, the project also influences creation of employment opportunities for local people, which would enhance their social status.
2. Environmental well being: The project activity replaces the fossil fuel based power and steam by renewable energy (biomass based power and steam) and thereby resulting in reduction of greenhouse gas (GHG) emissions.
3. Technological well being: The project activity utilizes biomass as fuel to generate steam, which further drives solidly forged and machined turbine to generate power. The exhaust gas is passed through the electrostatic precipitator (ESP) in order to remove particulate matter before sending out to the atmosphere. The project activity represents the environmentally safe technology for the application.

A.3. Project participants:

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Name of Party involved (*) ((host) indicates a host party)	Private and/or public entity(ies) Project participants(*) (as applicable)	Party involved wishes to be considered as project participant (Yes/No)
India	Nahar Industrial Enterprises Limited	No

A.4. Technical description of the small-scale project activity:

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A.4.1. Location of the small-scale project activity:

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Nahar Industrial Enterprises Limited
P.O. Dappar
Village Jalalpur
Shibzada Ajit Singh Nagar District
Punjab 140506
India

A.4.1.1. Host Party(ies):

>>

Country: India

A.4.1.2. Region/State/Province etc.:

>>

State: Punjab

A.4.1.3. City/Town/Community etc:

>>

District: Shibzada Ajit Singh Nagar (Mohali)

Village: Jalalpur

A.4.1.4. Detail of physical location, including information allowing the unique identification of this small-scale project activity(ies):

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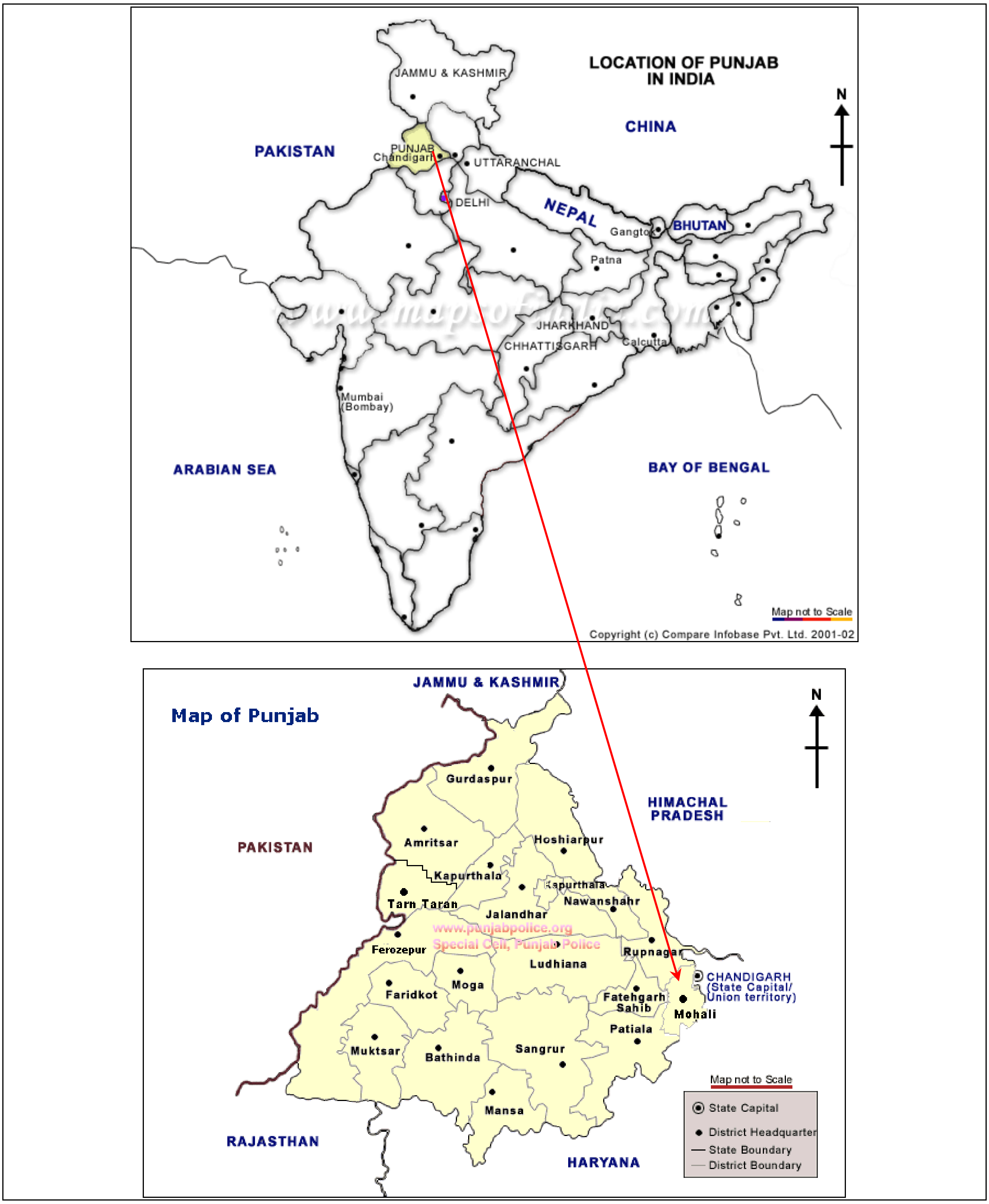
The project activity is located at Jalalpur village (near Lalru) in Dappar PO, Shibzada Ajit Singh Nagar (Mohali) district, Punjab, India. Lalru was a *tahsil* in Pinjaur Nizamat of erstwhile state of Patiala. It is now the biggest panchayat located between Dera Bassi and Ambala on the main road. The project activity lies in latitude 30º57' N and longitude 76º22' E. The following map shows the geographical location of the project activity:


LOCATION OF PUNJAB IN INDIA
N
JAMMU & KASHMIR
PAKISTAN
CHINA
PUNJAB
Chandigarh
UTTARANCHAL
DELHI
NEPAL
Gangtok
BHUTAN
Patna
JHARKHAND
CHHATTISGARH
Calcutta
Mumbai (Bombay)
ARABIAN SEA
BAY OF BENGAL
Map not to Scale
Copyright (c) Compare Infobase Pvt. Ltd. 2001-02
Map of Punjab
JAMMU & KASHMIR
N
Gurdaspur
HIMACHAL PRADESH
Amritsar
PAKISTAN
Hoshiarpur
Kapurthala
Kapurthala
Tarn Taran
Nawanshahr
Jalandhar
www.punjabpolice.org
Special Cell, Punjab Police
Ferozepur
Rupnagar
Ludhiana
CHANDIGARH (State Capital/ Union territory)
Moga
Faridkot
Fatehgarh Sahib
Mohali
Patiala
Muktsar
Bathinda
Sangrur
Map not to Scale
Mansa
RAJASTHAN
HARYANA
State Capital
District Headquarter
State Boundary
District Boundary

A.4.2. Type and category(ies) and technology of the small-scale project activity:

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The project activity is a rice husk based 5 MW cogeneration plant which displaces both grid power supply and steam from oil fired boilers. As the project activity uses biomass (Renewable energy) as fuel, it comes under the **Type I - Renewable energy projects** in the indicative simplified baseline and monitoring methodologies for selected small-scale CDM project activity categories.

If the unit added has both renewable and non-renewable components (e.g. a wind/diesel unit), the eligibility limit of 15 MW for type I small-scale CDM project activity applies only to the renewable component. Since the project activity is rice husk based 5 MW cogeneration plant, it clearly satisfies this eligibility criteria.

And further, since this project displaces the fossil fuel based thermal energy, it falls under the **Category C - Thermal energy for the user (Version 09, 23rd December 2006)**

This category comprises renewable energy technologies that supply individual households or users with thermal energy that displaces fossil fuels. Upgrading of existing equipment is not allowed. Examples include solar thermal water heaters and dryers, solar cookers, energy derived from renewable biomass for water heating, space heating, or drying, and other technologies that provide thermal energy that displaces fossil fuel. *Biomass-based co-generating systems that produce heat and electricity for use on-site are included in this category*.

Further for co-generation systems and/or co-fired systems to qualify under this category, the energy output shall not exceed 45 $MW_{thermal}$. E.g., for a biomass based co-generating system the capacity for all the boilers affected by the project activity combined shall not exceed 45 $MW_{thermal}$.

The proposed project activity is a rice husk based cogeneration project to produce heat (steam) and electricity for on-site use. It qualifies in the above category since the rating of the boiler is less than the stipulated limit as shown below:

Boiler Capacity:	40 TPH
	11.11 kg/s
Energy of steam	3254.8 kJ/kg (at 45 kg/cm^2 and 420ºC temperature)
	3.254 MJ/kg
Energy of water (at 100° C)	418 kJ/kg
	0.418 MJ/kg

Boiler rating 11.11* (3.254 – 0.418)

31.51 $MW_{thermal}$

The project activity satisfies the above criteria since the rating of the boiler is less than 45 $MW_{thermal}$

Technology of project activity

The cogeneration plant utilizes rice husk as fuel to generate 40 TPH steam at 45 $kg/cm^2_{(a)}$, and 420 deg C. The steam drives the 5.0 MW extraction cum condensing turbo-generator to generate power. Apart from these two main components, the co-generation plant constitutes of fuel handling system, ash handling system and water system. The technical description of these systems is discussed below:

Boiler

The steam generating system for the cogeneration plant consists of one rice husk fired AFBC boiler with the steam generation capacity of 40.0 TPH with steam outlet parameters of 45 $kg/cm^2_{(g)}$, 420 deg C. The boiler is provided with dust collection system for reducing the outlet flue gas dust concentration levels. The boiler operates with balanced draft conditions, with the help of Forced and Induced Draft fans. There is common de-aerator which de-aerates the feed water and supply the feed water to the feed water pumps at about 105 deg C.

Steam Turbine

The entire steam generated in the boiler is fed to the extraction cum condensing turbo-generator. The controlled extraction from the turbine at 8-8.5 $kg/cm^2_{(a)}$ gives 22 TPH of steam approximately at a temperature of 270 deg C.

Fuel Handling System

The bought out rice husk from the storage yard is made available at the inlet of the feeding system through the belt conveyors. The rice husk feeding system includes a rice husk storage silo with storage capacity of at least 10 minutes of the MCR requirement, inlet chutes, feeders, feed chutes, and the distributor. The rice husk input to the steam generator is regulated by the rice husk feeding system through the combustion control system. Suitable isolation gates are provided between feed conveyor and rice husk silo. The inlet and the feed chutes are designed to prevent choking of rice husk and necessary poking facilities are given. The distributor is of pneumatic type with provision to distribute the fuel uniformly across the furnace.

Ash handling system

The ash handling system is having slot conveyors, rotary feeders and chain conveyors for handling both bottom ash and fly ash. All the collected ash is disposed off in trucks to be used for land filling or to be used as nutrients in the cane fields.

A.4.3. Brief explanation of how the anthropogenic emissions of anthropogenic greenhouse gas (GHGs) by sources are to be reduced by the proposed small-scale project activity, including why the emission reductions would not occur in the absence of the proposed small-scale project activity, taking into account national and/or sectoral policies and circumstances:

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The project activity displaces both the Fuel Oil (FO) based steam generation and the grid based electricity, by carbon neutral fuel (rice husk) based co-generation thus avoiding GHG emissions. No policy exists in the Punjab state for renewable energy based power/co-generation. NIEL has taken the voluntary initiative to implement this project activity in order to reduce the GHG emissions. There will be GHG emission reduction of around **448,200** tonnes of CO_2e over a 10 year crediting period.

A.4.3.1 Estimated amount of emission reductions over the chosen crediting period:

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Years	**Annual Estimation of emission reduction in tonnes of CO_2e**
2007-2008	44,820
2008-2009	44,820
2009-2010	44,820
2010-2011	44,820
2011-2012	44,820
2012-2013	44,820
2013-2014	44,820
2014-2015	44,820
2015-2016	44,820
2016-2017	44,820
Total estimated reductions (tonnes of CO_2e)	448,200
Total number of crediting years	**10 years**
Annual Average over the crediting period of estimated reduction (tonnes of CO_2e)	44,820

A.4.4. Public funding of the small-scale project activity:

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No public funding as part of project financing from parties included in Annex I of the convention is involved in the project activity.

A.4.5. Confirmation that the small-scale project activity is not a debundled component of a larger project activity:

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As per Appendix C of the Simplified Modalities and Procedures for Small-scale CDM project activities, the fragmentation of a large project activity into smaller parts is called as debundling. The guideline for debundling mentioned in paragraph 2 of appendix C is given as follows:

A proposed small scale project activity shall be deemed to be a debundled component of a large project activity, if there is a registered small-scale CDM project activity or an application to register another small-scale CDM project activity.

- With the same project participants;
- In the same project category and technology/measure; and
- Registered within the previous 2 years
- Whose project boundary is within 1 km of the project boundary of the proposed small-scale activity at the closest point.

The proposed project activity is not a debundled component of a large project activity as the project proponents neither have registered any project activity within the previous 2 years for the same project category nor do they propose to set up another biomass based cogeneration plant within 1 km radius of the proposed small-scale activity.

SECTION B. Application of a baseline methodology:

B.1. Title and reference of the approved baseline methodology applied to the small-scale project activity:

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As explained earlier in A.4.2, the project activity satisfies the eligibility criteria of "Simplified modalities and procedures for small-scale CDM project facilities".

The approved baseline methodology has been referred from the indicative simplified baseline and monitoring methodologies for selected small-scale CDM project activity categories - version 09 - 23rd December 2006. From this reference, the following category is selected for the project activity:

Type I – Renewable energy projects

Category C – Thermal energy for the user.

B.2 Project category applicable to the small-scale project activity:

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Indicative simplified baseline and monitoring methodologies for selected small-scale CDM project activity categories are given in indicative simplified baseline and monitoring methodologies for selected small-scale CDM project activity categories - version 09 – 23rd December 2006. As already mentioned in A4.2, since the project activity displaces both fossil fuel for thermal energy and electricity from PSEB, it comes under the Type I: Category C – Thermal energy for the user.

In the above mentioned document, Baseline for projects under Category I.C has been given in paragraphs 6 and 7.

1. For renewable energy technologies that displace technologies using fossil fuels, the simplified baseline is the fuel consumption of the technologies that would have been used in the absence of the project activity times an emission coefficient for the fossil fuel displaced.
2. Further for renewable energy technologies that displace electricity, the simplified baseline is the electricity consumption times the relevant emission factor calculated as described in category I.D

Since the project activity displaces both oil fired boiler and PSEB power, the baseline is summation of both 1 and 2.

As described in category I.D., the electricity grid baseline is the kWh produced by the renewable generating unit multiplied by an emission coefficient (measured in kg CO_2e /kWh) calculated in a transparent and conservative manner as:

(a) A combined margin (CM), consisting of the combination of operating margin (OM) and build margin (BM) according to the procedures prescribed in the approved methodology ACM0002.

Any of the four procedures to calculate the operating margin can be chosen, but the restrictions to use the Simple OM and the Average OM calculations must be considered.

OR

(b) The weighted average emissions (in kg CO_2e /kWh) of the current generation mix. The data of the year in which project generation occurs must be used.

In India, the electrical transmission systems are divided into five regions namely Northern Region, North Eastern Region, Eastern Region, Southern Region and Western Region. Northern region grid comprises of Delhi, Punjab, Haryana, Chandigarh, Rajasthan, Jammu & Kashmir, Uttranchal, Uttar Pradesh and Himachal Pradesh. The location of project activity is in Punjab state, which falls under Northern region. Therefore, Northern grid region is picked out as grid boundary to calculate the baseline emission factor.
In the northern regional grid, there would be substantial addition (2002-2012[1]) of fossil fuel (14,309 MW), hydro power (17,036 MW) and nuclear power (2,000 MW) based generation. In order to take care of future capacity additions trend, the estimation of baseline emission is done by option (a) i.e. the combined margin approach. Therefore, it would represent the realistic anthropogenic emissions by sources that would occur in absence of the project activity. The details of the baseline have been provided in Annex 3.

B.3. Description of how the anthropogenic emissions of GHG by sources are reduced below those that would have occurred in the absence of the registered small-scale CDM project activity:

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The project proponent was well aware of the possible CDM benefits associated with the project activity. The following documents to substantiate the fact that CDM was seriously considered in the decision to undertake the project have been submitted to the DOE:

a) Internal memo to the top management seeking approval for the implementation of the project activity, Dated 03/11/2000
b) True copy of the abstract/resolution passed by the board of directors of the company in its meeting held on 11/01/2001

The project activity is associated with the following barriers to its implementation and it was felt that the benefits due to sale of carbon credits would help NIEL to overcome these barriers.

Barriers due to prevailing practice

[1] http://mnes.nic.in/baselinepdfs/annexure3a.pdf; http://mnes.nic.in/baselinepdfs/annexure4.pdf

Generally in Punjab state, the textile industry operates boiler to meet steam requirements and depends on PSEB or DG for power. One biomass fired demonstration plant of 10 MW capacity was commissioned earlier by MNES in collaboration with PSEB at Jalkheri (Punjab) in the year 1992 using rice straw. The plant was a failure and another trial was carried out during 2001 but again it wasn't successful[2].

In spite of this, NIEL decided to implement this project which is invariably first time in the textile sector in the Punjab state (NIEL was certified and commended by Punjab Textile and Spinning Mill Association for having installed the first biomass based cogeneration plant in the textile sector in the state of Punjab). Hence there is barrier associated with the project activity due to prevailing practice.

The electricity supply for Textile mills in Punjab state normally would be from PSEB. Punjab's textile industry does not have any motivation or compulsion to invest in biomass based cogeneration projects. It is to be noted that as per Punjab Energy Development Agency, exploited co-generation potential from non-sugar plant in Punjab state[3] is nil.

From the above analysis, it is clear that there is no biomass based cogeneration project under commissioning in Punjab state without CDM consideration. In spite of this prevailing practice, NIEL has initiated voluntarily to take up the biomass based cogeneration project at Lalru unit.

Organizational Barrier

NIEL is basically textile industry, which does not have any core competency in operating & maintaining the cogeneration plant. Considering this factor, NIEL management was initially reluctant to approve this project activity. However, after perceiving the carbon credit benefit, NIEL decided to take up this project.

Besides above discussed barriers, NIEL was one such entrepreneur who has initiated this GHG reduction project under CDM.

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[2] 10.0 MW Biomass based independent power project of Jalkheri Power Private Limited, Jalkheri, Punjab.

[3] http://punjabgovt.nic.in/Industry/PEDA.htm

Technological barrier

Nahar Industrial Enterprises Limited (NIEL) manufactures fabrics like grey fabric, processed fabric etc,. Electrical energy and steam forms vital input for fabric manufacturing process. Steam is used in various processes and equipments of fabric manufacturing like Singeing, Desizing, Bleaching, Mercerizing etc, and any disruption in supply of electrical energy and steam would affect the production processes and subsequently lead to production losses. Considering the criticality of supply of steam and power, NIEL had installed FO based boilers for meeting the requirement of steam (since the technology and operation of FO based boiler is well proven and FO based boiler are subjected to minimal breakdown) and diesel generators along with supply from PSEB grid for meeting the requirement of power.

NIEL being an environment conscious organization decided to implement a 5 MW rice husk based cogeneration system in light of concerns on global warming caused due to emissions of greenhouse gases. The rice husk based cogeneration system would replace both the power supply from PSEB and the steam generated from oil fired boiler.

The project activity has following perceived technological and operational risks. The ash generated during rice husk combustion is of low density and high silica content. Due to low bulk density, ash adheres to the boiler tubes, thereby affecting the heat transfer and reducing thermal efficiency. As well the high percentage of silica may lead to rapid erosion of the equipments. Due to high silica content and the shape of rice husk, equipments like ID fan, cone portion of air pre-heater and top portion of the stack may get eroded which leads to high maintenance cost, frequent breakdown and increased downtime. Presence of silica in rice husk ash also corrodes boiler tubes which may lead to frequent breakdown of the boiler.

The fabric manufacturing process being a continuous process, any disruption in supply of steam and power would lead to production losses and NIEL would be incurring huge financial losses. The perceived technological and operating risks of project activity may lead to events of boiler breakdown and CDM revenue from the project activity would help in covering the perceived technological and operational risks.

From the above paragraphs, it is clear that the project activity faced barriers, but in spite of that, NIEL decided to implement this project after considering that the carbon credit would help the project to mitigate the barrier.

B.4. Description of how the definition of the project boundary related to the baseline methodology selected is applied to the small-scale project activity:

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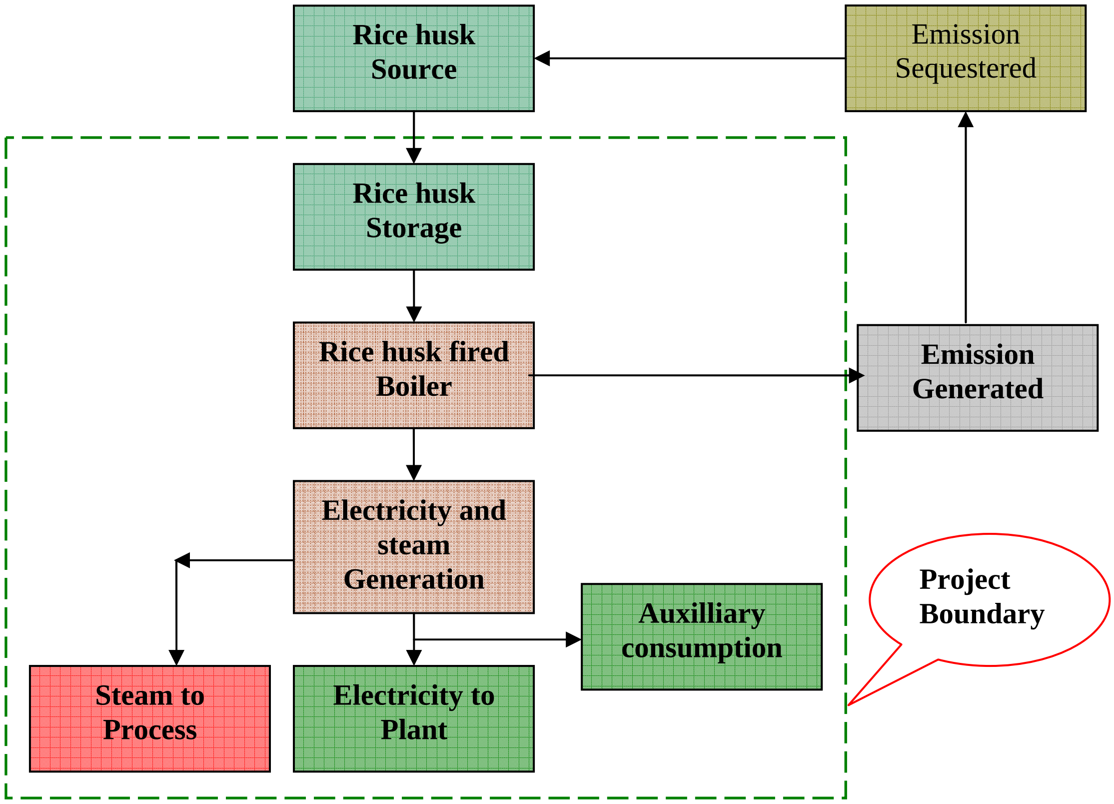
In paragraph 5 of Type I. Category C. of indicative simplified baseline and monitoring methodologies for selected small-scale CDM project activity categories - version 09 – 23rd December 2006, the guideline for project boundary is given as "*the physical, geographical site of the renewable energy generation delineates the project boundary*".

The project boundary extends from the rice husk storage area to the point of power and steam supply to plant where the project proponent has a full control. F.O. based boilers are not included in the project boundary. For the purpose of calculation of baseline emissions, northern grid is also included in the system boundary.



B.5. Details of the baseline and its development:

>>

The baseline for the proposed project activity has been arrived by using the methodology specified in the applicable project category for small-scale CDM project activities.

Since the project activity displaces both grid electricity and fossil fuel based thermal energy, the baseline is the fuel consumption of the technologies that would have been used in the absence of the project activity times an emission coefficient for the fossil fuel displaced and the electricity consumption times the relevant emission factor calculated. IPCC default values for emission coefficients of fossil fuel are used. Northern grid emission factor of 0.7508 kg CO_2/kWh is used as given in Annex 3.

Date of completion of the baseline: 25/01/2007

Contact Information

Name of person/entity determining the baseline:

Nahar Industrial Enterprises Limited

The project participant contact details are given in Annex 1 of this document.

SECTION C. Duration of the project activity / Crediting period:

C.1. Duration of the small-scale project activity:

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C.1.1. Starting date of the small-scale project activity:

>>
26/06/2001 (Date of the invoice for 40TPH boiler from Thermodyne technologies Limited)

C.1.2. Expected operational lifetime of the small-scale project activity:

>>
25 years

C.2. Choice of crediting period and related information:

>>
The project proponent has decided to claim carbon credits for fixed ten years period.

C.2.1. Renewable crediting period:

>>
Not applicable

C.2.1.1. Starting date of the first crediting period:

>>
Not applicable

C.2.1.2. Length of the first crediting period:

>>
Not applicable

C.2.2. Fixed crediting period:

>>

C.2.2.1. Starting date:

>>
01/05/2007
The project participant hereby confirms that the crediting period will not commence prior to the date of registration

C.2.2.2. Length:

>>
10 years, 0 months

SECTION D. Application of a monitoring methodology and plan:

>>

D.1. Name and reference of approved monitoring methodology applied to the small-scale project activity:

>>

The approved monitoring methodology of the project activity is as follows:

Type I – Renewable energy projects

Category C – thermal energy for the user.

Reference: The monitoring methodology of the project activity is referred from 'Paragraph 9' of Type I - Category C of indicative simplified baseline and monitoring methodologies for selected small-scale CDM project activity categories - version 09 – 23rd December 2006'.

D.2. Justification of the choice of the methodology and why it is applicable to the small-scale project activity:

>>

As mentioned in the paragraph 12 of Simplified Modalities and Procedures for Small Scale CDM Project Activities, the "Project participants may use the simplified baseline and monitoring methodologies specified in appendix B for their project category", if they meet the applicability criteria of Small scale CDM project activity. As discussed earlier in A4.2, the project activity is a small-scale CDM project of Type I. category C, the monitoring plan has been developed as per the guidance provided in paragraph 9 of indicative simplified baseline and monitoring methodologies for selected small-scale CDM project activity categories - version 09 - 23rd December 2006'.

The project activity displaces thermal energy from oil fired boiler and power supply from PSEB grid, therefore the aforementioned monitoring methodology will be applicable to this project activity.

Description of monitoring plan

There are two separate energy meters to record the gross power produced and auxiliary power consumed in the project activity. The electrical energy monitoring would be required as the calculation of the emission reductions is based on the electricity displaced. As far as electricity is concerned, the monitoring and verification system would mainly comprise of these meters. The steam input is also required to be monitored, in order to calculate the emission reductions due to thermal energy displacement. The flow rate, pressure and temperature of steam supplied to process are monitored by steam flow meter, pressure gauge and temperature indicator. All instruments will be calibrated at regular intervals so that the accuracy of measurement can be ensured at all the time. The fuel consumption if any in the FO fired boilers kept as standby will also be monitored and recorded during the crediting period.

GHG Sources

Direct On-Site Emissions

Direct on-site emissions of the project activity are nil as the rice husk, the carbon neutral fuel is used in the project activity. Otherwise, the CO_2 emission due to the combustion of rice husk is the direct on-site emission, which is nullified by the photosynthesis process of paddy crops. Therefore, it "recycles" atmospheric carbon and does not add to the greenhouse effect.

Direct Off-Site Emissions

The transportation of rice husk causes emission of GHG. These emissions would be regarded as direct off-site emissions due to the project activity. Since similar quantum of emissions would have occurred in the baseline also, due to the transport of coal for the grid connected power plants and FO for the onsite DG sets. Thus the net direct off-site emissions could be regarded as negligible.

Indirect On-Site Emissions

The emission due to energy consumption during the construction of the project would be considered as indirect on site GHG source. By viewing the life of the cogeneration plant, emissions from the above-mentioned source are too small and hence neglected. No other indirect on-site emissions are anticipated from the project activity.

Leakage

According to attachment C to appendix B of Indicative simplified baseline and monitoring methodologies for selected small-scale CDM project activity categories –"General guidance on leakage in biomass project activities" Version 2, for small scale project activities involving renewable biomass, there are three types of sources that are potentially significant (>10% of emission reductions) and attributable to the project activities. These emission sources may be project emissions (if under the control of project participants, i.e. if the land area where the biomass is grown is included in the project boundary) or sources of leakage (if the source is not under control of project participants). The following table summarizes, for different types of biomass, the cases where the emission source is relevant and the cases where it is not.

Biomass type	Activity /	Shift of pre-	Emissions from	Competing use

	source	project activities	biomass generation / cultivation	of biomass
Biomass from forests	Existing forests	-	-	X
	New forests	X	X	-
Biomass from croplands or grasslands (woody or nonwoody)	In the absence of the project the land would be used as cropland / wetland	X	X	-
	In the absence of the project the land would be abandoned	-	X	-
Biomass residues or wastes	Biomass residues or wastes are collected and used	-	-	X

The leakage emission source identified for the proposed project activity which utilizes biomass residues (rice husk) for electricity and steam generation is:

- Competing uses of biomass *(As per the above table)* - The biomass may in the absence of the project activity be used elsewhere, for the same or a different purpose.

To evaluate the same, biomass assessment in the region (the region is defined as the area within 100 km radius of the project activity area) will be carried out annually based on latest available literature / data from the government sources. In the absence of the official data, a biomass assessment study will be carried out. If it is demonstrated that the quantity of available biomass in the region, is at least 25% larger than the quantity of biomass that is utilised including the project activity, then this source of leakage shall be neglected otherwise this leakage shall be estimated and deducted from the emission reductions.

D.3 Data to be monitored:

>>

a) Parameters affecting the emission reduction potential of the project activity

ID No.	Data type	Data Variable	Data unit	Measured (m), calculated (c) or estimated (e)	Recording frequency	Proportion of data to be monitored	How will the data be archived? (electronic/ paper)	For how long is archived data to be kept?	Comment
1	Power	Total electricity generated	kWh	m	Continuous	Total	Electronic/Paper	Crediting Period (CP)+2 years	Used for calculating baseline emissions
2	Power	Auxiliary consumption	kWh	m	daily	Total	Electronic/Paper	CP + 2 years	Used for calculating baseline emissions.
3	Power	Power supplied to plant	kWh	c	Continuous	Total	Electronic/Paper	CP+2 years	Used for calculating baseline emissions.
4	Steam	Steam supplied to process	Tons	m	Continuous	Total	Electronic/Paper	CP+2 years	Used for calculating baseline emissions.
5	Steam	Steam pressure	$kg/cm^2_{(abs)}$	m	daily	Total	Electronic/Paper	CP+2 years	Used for calculating baseline emissions.
6	Steam	Steam temperature	Deg C	m	daily	Total	Electronic/Paper	CP+2 years	Used for calculating baseline emissions.
7	Steam	Generated by FO boiler	TPH	m	As and When used	Total	Electronic/Paper	CP + 2 years	Used for calculating leakage
8	Steam	Steam pressure of the FO boiler	$kg/cm^2_{(abs)}$	m	As and When used	Total	Electronic/Paper	CP+2 years	Used for calculating leakage
9	Steam	Steam temperature of the FO boiler	Deg C	m	As and When used	Total	Electronic/Paper	CP+2 years	Used for calculating leakage
10	Efficiency	Efficiency of the FO Boiler	%	m	As and When used	Total	Electronic/Paper	CP+2 years	Used for calculating leakage

b) Fuel related parameters affecting the project activity

ID No.	Data type	Data variable	Data unit	Measured (m), calculated (c) or estimated (e)	Recording Frequency	Proportion of data to be monitored	How will the data be archived? (electronic/ paper)	For how long is archived data to be kept?	Comment
1	Fuel	Biomass Quantity	MT	m	Batchwise	Total	Electronic/Paper	CP + 2 years	Measured in plant premises Electronic weighing and record on paper
2	Fuel	Net Calorific Value of fuel Rice husk	kcal/kg	m	Yearly	Actual sample tested	Electronic/Paper	CP + 2 years	
3	Fuel	Coal quantity	MT	m	Batchwise	Total	ElectronFuelic/Paper	CP + 2 years	Measured in plant premises Electronic weighing and record on paper, whenever it has been used.
4	Fuel	Carbon content of coal	%	m	Batchwise	Actual sample tested	Electronic/Paper	CP + 2 years	

c) Leakage

ID No.	Data type	Data variable	Data unit	Measured (m), calculated (c) or estimated (e)	Recording Frequency	Proportion of data to be monitored	How will the data be archived? (electronic/ paper)	For how long is archived data to be kept?	Comment
1	Fuel	Surplus biomass	%	e	yearly	100%	Electronic/Paper	CP + 2 years	Biomass assessment in the region (the region is defined as the area within 100 km radius of the project activity area) will be carried out annually based on latest available literature / data from the government sources. In the absence of the official data, a biomass assessment study will be carried out. If it is demonstrated that the quantity of available biomass in the region, is at least 25% larger than the quantity of biomass that is utilised including the project activity, then this source of leakage can be neglected otherwise this leakage shall be estimated and deducted from the emission reductions.

D.4. Qualitative explanation of how quality control (QC) and quality assurance (QA) procedures are undertaken:

>>

Quality control (QC) and quality assurance (QA) procedures are being undertaken for the data monitored.

The details are as follows:

Data	Uncertainty level of data (High/Medium/Low)	Are QA/QC procedures planned for these data?
D.3.(a)1	Low	Yes
D.3.(a)2	Low	Yes
D.3.(a)4	Low	Yes
D.3.(a)5	Low	Yes
D.3.(a)6	Low	Yes
D.3.(a)7	Low	Yes
D.3.(a)8	Low	Yes
D.3.(a)9	Low	Yes
D.3.(a)10	Low	Yes
D.3.(b)1	Low	Yes
D.3.(b)2	Low	Yes
D.3.(b)3	Low	Yes
D.3. (c)1	Low	Yes

Project Parameters affecting Emission Reduction

Fuel related parameters:

Quantity of rice husk used in the boiler as fuel

The quantity of rice husk entering the plant will be measured and records of the same will be maintained. The weighing system would be calibrated regularly to ensure the accuracy of the measurement. The data will be recorded for further verification with the amount of rice husk mentioned in invoices / receipts from fuel contractors.

Quality of rice husk used in the boiler

The properties of the rice husk such as calorific value would be determined from ultimate analysis.

Operational Parameters of the co-generation unit

Total Electricity Generated

In the plant premises, the total electricity generated by the cogeneration project is measured to the best accuracy and is monitored and recorded, on a continuous basis by the electronic energy meter. The integrated readings are logged on manual log book for every 8 hour shift.

Auxiliary Consumption

As the total quantum of electricity consumed by the auxiliaries would affect the total electricity supplied to the manufacturing facility and therefore the amount of GHG reductions, the auxiliary electricity consumption is measured and recorded in the plant premises by the electronic energy meter. The integrated readings are recorded on manual log book for every 8 hour shift.

Power exported to the manufacturing facility

It is calculated based on deduction of auxiliary consumption from the total electricity generated.

Steam supplied to Process

Steam quantity supplied to process from cogeneration system is measured by steam flow meter and steam conditions like pressure and temperature are monitored continuously.

D.5. Please describe briefly the operational and management structure that the project participant(s) will implement in order to monitor emission reductions and any leakage effects generated by the project activity:

>>

NIEL would ensure accuracy of the measurement system by adopting the following operational and management structure.

The shift in-charges are responsible for the eight-hourly data recording of the relevant parameters mentioned in the monitoring plan. The mechanical and electrical managers would ensure that the data is properly collected and stored electronically/paper. The monthly report would be prepared by Electrical-in-charge by aggregating the daily readings. Any discrepancy observed in the readings would be handled responsively. The electrical department would forward the monthly report to finance department for the cross-verification. After cross-verification, the finance department would submit the report to top management. The managers are qualified technical personnel with more than 5 years experience in relevant field. All the shift in-charges are trained and experienced diploma holders. Vice president Technical will be the overall in-charge for the project activity. Deputy Manager (Plant) has the responsibility for calibration and monitoring. Various technology suppliers (boiler, turbine) have given training to the plant personnel on operation, maintenance and safety aspects.

D.6. Name of person/entity determining the monitoring methodology:

>>

Nahar Industrial Enterprises Limited.

The project participant details are given in Annex 1 of this document.

SECTION E.: Estimation of GHG emissions by sources:

E.1. Formulae used:

>>

E.1.1 Selected formulae as provided in appendix B:

>>

The formula for estimation of GHG emission reduction is not mentioned for Type I Category C. of indicative simplified baseline and monitoring methodologies for selected small-scale CDM project activity categories - version 09 – 23rd December 2006'.

E.1.2 Description of formulae when not provided in appendix B:

>>

Since there is no formula mentioned in Type I Category C. of Indicative simplified baseline and monitoring methodologies for selected small-scale CDM project activity categories - Version 09 – 23rd December 2006, emission reductions due to the project activity is estimated based on a conservative approach, which is discussed in the following sections.

E.1.2.1 Describe the formulae used to estimate anthropogenic emissions by sources of GHGs due to the project activity within the project boundary:

>>

The GHG emission due to the combustion of biomass is neutralized by the sequestration done during the growth of the biomass, thereby making it a carbon neutral fuel. Further the rice husk contains negligible quantities of nitrogen and sulphur, the other green house gas from the combustion of rice husk can be considered as negligible. Therefore essentially there would not be any GHG emissions due to the project activity within the project boundary.

However, in case of emergencies, if any quantity of coal is used then the estimation of CO_2 emissions would be done as follows:

Project activity emissions due to combustion of coal

= (44/12) x Percentage of total carbon in coal x Quantity of coal used

During startup some charcoal is used which is in the range of 300-400 kg per annum. The project emissions corresponding to this amount of fossil fuel are insignificant i.e. 0.88 tCO_2/yr and hence neglected.

E.1.2.2 Describe the formulae used to estimate leakage due to the project activity, where required, for the applicable project category in appendix B of the simplified modalities and procedures for small-scale CDM project activities

>>

As mentioned in paragraph 8 of Type I Category C of indicative simplified baseline and monitoring methodologies for selected small-scale CDM project activity categories - version 09 – 23rd December 2006, the leakage estimation is only required if the equipment of the project activity is transferred from another activity or the existing equipment is transferred to another activity.

The source of GHG emissions which are attributable to the project activity lying outside the project boundary will be the emissions arising during the transportation of rice husk (This would also not be very significant as rice husk is abundantly available in the nearby vicinity, thereby not much transportation distance of rice husk is involved in the project activity). The same have been estimated below:

Emissions due to the transportation of Rice husk

Calculations of emissions due to transportation of biomass		
Total rice husk required	65712.5	tonnes/year
Rice husk transported by truck	65712.5	tonnes/year
Rice husk load per truck	8	tonnes
Total number of Trips	8214	
Max distance between the Project site and collection centers	50	km
Consumption of diesel per trip (to and fro)(@ 4 km/ lit)	25	Liters
Total Diesel Consumption	205351.6	Liters
Calorific Value of Diesel	2.83E-05	TJ/lit
Emission Factor for Diesel	74.1	tonnes of CO_2/TJ
Total Emissions due to transportation of Rice husk	431	tCO_2

Since similar quantum of emissions would have occurred in the baseline also, due to the transport of coal for the grid connected power plants and FO for the onsite DG sets. Also as per attachment C to appendix B of Indicative simplified baseline and monitoring methodology for selected small-scale CDM project activity categories (Point No.12, Page-3), as these emissions are less than 10 %, these can therefore be neglected in the context of SSC project activities.

In addition to above, leakage emissions can also occur due to transportation of the fly ash for disposal. The distance between the ash disposal site and the project site is approximately 100 m, which is very less and hence the emissions due to the same have also been neglected.

As per para 18 in attachment C to appendix B of Indicative simplified baseline and monitoring methodology for selected small-scale CDM project activity categories, it has been specified that “The project participant shall evaluate if there is a surplus of the biomass in the region of the project activity, which is not utilised. If it is demonstrated that the quantity of available biomass in the region, is at least 25% larger than the quantity of biomass that is utilised including the project activity, then this source of leakage can be neglected otherwise this leakage shall be estimated and deducted from the emission reductions.

Now according to attachment C to appendix B of Indicative simplified baseline and monitoring methodologies for selected small-scale CDM project activity categories –“General guidance on leakage in biomass project activities” Version 2, for small scale activities involving renewable biomass, there are three types of sources that are potentially significant (>10% of emission reductions) and attributable to the project activities. These emission sources may be project emissions (if under the control of project participants, i.e. if the land area where the biomass is grown is included in the project boundary) or sources of leakage (if the source is not under control of project participants). The following table summarizes, for different types of biomass, the cases where the emission source is relevant and the cases where it is not.

Biomass type	**Activity / source**	**Shift of pre-project activities**	**Emissions from biomass generation / cultivation**	**Competing use of biomass**
Biomass from forests	Existing forests	-	-	x
	New forests	X	X	-
Biomass from croplands or grasslands (woody or nonwoody)	In the absence of the project the land would be used as cropland / wetland	X	X	-

	In the absence of the project the land would be abandoned	-	X	-
Biomass residues or wastes	Biomass residues or wastes are collected and used	-	-	x

For the project activity, the leakage emission sources can be identified as follows:

1. As the project activity utilizes only rice husk (biomass residue), the implementation of project activity did not lead to shifting of pre-project activities.
2. The rice husk being used in the project activity is a waste generated from the rice crop. This waste would have anyways been generated even in the absence of the project activity and would have burnt without being used productively. The plant uses the waste generated and does not need application of fertilizer and clearance of land. Hence there are no emissions due to the same.
3. The only possible source of leakage in the project activity can be competing uses of biomass - The biomass may in the absence of the project activity be used elsewhere, for the same or a different purpose. The same is evaluated below:

   The District Biomass Assessment Study for Patiala prepared by reputed organisation The Energy and Resources Institute (TERI) is used to arrive at the net surplus biomass available in the region. The figures of net surplus biomass available for the district has been arrived at after deducting all competing uses of biomass in the region such as for fertiliser, manure, energy generation as well as other industrial uses. Thus it addresses the competing uses of biomass as specified in para 17 of the attachment C to Appendix B.

   Total Quantity of biomass (paddy husk) available in Patiala[4] ($TQ_{Biomass}$) =136255 MT/yr
   Biomass Quantity utilized by other users ($BQ_{others\ users}$) = 3406 MT/yr
   Biomass Quantity utilized by project activity ($BQ_{project}$) =65712.5MT/yr
   Quantity of Biomass less than the required 25% larger than combined usage ($LQ_{Biomass}$) = 49857 MT/yr

[4] District Biomass Assessment Study - Patiala, T E R I Report No. 2003SF62

The availability of biomass material (rice husk) in the Patiala district where plant is located is around 1.36 Million Tonnes per annum of which the utilization including the project activity is 0.69 Million Tonnes per annum. Since $LQ_{Biomass}$ is positive then there would be no leakage. This indicates that availability is 25% more than the present requirement including the project activity and hence the leakage can be neglected.

To evaluate annually if there is a surplus of the biomass in the region (the region is defined as the area within 100 km radius of the project activity area) of the project activity, which is not utilized, a biomass assessment study will be carried out every year in the absence of the official data (available literature / data from the government sources) prior to the monitoring and verification of the project in the region. If the biomass assessment study demonstrates that the quantity of available biomass in the region, is at least 25% larger than the quantity of biomass that is utilised including the project activity, then this source of leakage will be neglected otherwise the leakage shall be estimated and deducted from the emission reductions.

The following approach will be adopted to account for leakage:

$LQ_{Biomass} = [TQ_{Biomass} - (BQ_{project} + BQ_{other\ users})*1.25]$

$LQ_{Biomass}$ = Quantity of Biomass less than the required 25% larger than combined usage in MT

$TQ_{Biomass}$ = Total Biomass Quantity available in the region in MT

$BQ_{project}$ = Biomass Quantity utilized by project activity in MT

$BQ_{others\ users}$ = Biomass Quantity utilized by other users in MT

In case $LQ_{Biomass}$ is positive (+) then there would be no leakage, hence Leakage (L) will be zero. However, if $LQ_{Biomass}$ is negative (-), then the leakage would be due to the use of equivalent amount of coal in the region and the same shall be calculated using the following formulae:

$$L = \{[-(LQ_{Biomass}) \times NCV_{Biomass}]\} \times EF_{Coal}$$

L = Leakage (tCO_2)

$LQ_{Biomass}$ = Quantity of Biomass less than the required 25% larger than combined usage in MT

$NCV_{Biomass}$ = Net Calorific Value of Biomass (in TJ/Kg)

EF_{Coal} = Emission Factor of Coal (IPCC Default, tCO_2/TJ)

As one of the two FO based boilers, would be kept as a standby arrangement for the new captive power plant inside the NIEL industry premises, the emissions from the same if used would be monitored throughout the crediting period and the leakage would be calculated as follows:

Step 1: Calculate Heat input to Boiler

Input energy to FO Boiler (TJ/year)

$$\frac{Steam_{Boiler}(T/hr) \times [Enthalpy_{Steam}(kJ/kg) - Enthalpy_{FeedWater}(kJ/kg)] \times 24 \times Noofdays \times 1000}{EfficiencyofBoiler(\eta) \times 1000000000} TJ/year$$

where
$Steam_{Boiler}$ is the steam generated by the FO Boiler
$Enthalpy_{Steam}$ is the enthalpy of steam
$Enthalpy_{Feedwater}$ is the enthalpy of feed-water

Step 2 : Emissions (tCO_2)

= Input energy to FO Boiler (TJ/year) X IPCC Emission factor for FO (tCO_2/ TJ)

E.1.2.3 The sum of E.1.2.1 and E.1.2.2 represents the small-scale project activity emissions:

>>

Thus the emissions due to the project activity would be only due to the combustion of coal in case of emergency and will be estimated as per the formula mentioned in E.1.2.1.

E.1.2.4 Describe the formulae used to estimate the anthropogenic emissions by sources of GHGs in the baseline using the baseline methodology for the applicable project category in appendix B of the simplified modalities and procedures for small-scale CDM project activities:

>>

The formula for estimating the baseline emission due to the project activity is as follows:

1. Emission due to displacement of electricity

Baseline emission due to displacement of electricity

= Electricity displaced by the project activity x Grid emission Factor

The electricity displaced by the project activity would be arrived by monitoring the amount of electricity supplied by the cogeneration system (Generation minus the auxiliary consumption) to the plant
The steps followed for the estimation of Grid emission factor is explained below:

Northern grid has been considered as the system boundary for the baseline emission calculations. The emission coefficient has been calculated in a transparent and conservative manner as follows:

The baseline emission factor is calculated by taking average of the "approximate operating margin" and the "build margin"

(i) The "approximate operating margin (OM)" is the weighted average emissions of all generating sources serving the system, excluding hydro, geothermal, wind, low-cost biomass, nuclear and solar generation

(ii) The "build margin (BM)" is the weighted average emissions (in kg CO_2equ/kWh) of recent capacity additions to the system

The calculation is done by adopting the following steps:

STEP 1. Calculation of Operating Margin emission factor (EF_{OM})

$$EF_{OM,y} = \sum_{i,j} F_{i,j} \times COEF_{i,j} / \sum_{j} GEN_{j}$$

Where

$COEF_{i,j}$ - the CO_2 emission coefficient of fuel i (t CO_2 / mass or volume unit of the fuel), calculated as given below and

$GEN_{j,}$ - the electricity (MWh) delivered to the grid by source j

$F_{i,j}$ - the amount of fuel i (in a mass or volume unit) consumed by relevant power sources j, calculated as given below

j - the power sources delivering electricity to the grid, not including low-operating cost and must-run power plants

The CO_2 emission coefficient $COEF_i$ is estimated as

$$COEF_{i} = NCV_{i} \times EF_{CO_2,i} \times OXID_{i}$$

Where

NCV_i - the net calorific value (energy content) per mass or volume unit of a fuel i

$EFCO_{2,i}$ - the CO_2 emission factor per unit of energy of the fuel i

$OXID_i$ - the oxidation factor of the fuel

The OM emission factor ($EF_{OM,y}$) has been calculated ex-ante separately for the most recent three years (2003-2004, 2004-2005 and 2005-2006) and an average value has been considered as the OM emission factor for the baseline ($EF_{OM,}$).

$$EF_{OM} = \sum EF_{OM,y} / 3$$

Where y represents the years.

STEP 2. Calculation of the Build Margin emission factor ($EF_{BM,}$)

It is calculated as the generation-weighted average emission factor (t CO_2/MWh) of a sample of power plants m of grid, as follows:

$$EF_{BM} = \sum_{i,m} F_{i,m} \times COEF_{i,m} / \sum_{m} GEN_{m}$$

Where

$F_{i,m}$, $COEF_{i,m}$ and GEN_{m} - are analogous to the variables described for the OM method above for plants m.

The Build Margin emission factor EF_{BM} has been calculated as ex ante based on the most recent information available on plants already built for sample group m of Northern grid at the time of PDD submission. The sample group m consists of the recent 20 % of power plants supplying electricity to grid, as it comprises of larger annual power generation.

Further, none of the power plant capacity additions in the sample group have been registered as CDM project activities.

STEP 3. Calculation of the electricity baseline emission factor (EF_y)

It is calculated as the weighted average of the Operating Margin emission factor ($EF_{OM,}$) and the Build Margin emission factor ($EF_{BM,}$):

$$EF_y = W_{OM} \times EF_{OM} + W_{BM} \times EF_{BM}$$

where the weights W_{OM} and W_{BM}, by default, are 50% (i.e., $W_{OM} = W_{BM} = 0.5$), and $EF_{OM,}$ and EF_{BM} are calculated as described in Steps 1 and 2 above and are expressed in t CO_2/MWh.

$$BE_y = EF_y \times EG_y$$

Where

BE_y - are the baseline emissions due to displacement of electricity during the year y in tons of CO_2

EG_y- is the net quantity of electricity generated by the project activity during the year y in MWh, and

EF $_y$- is the CO_2 baseline emission factor for the electricity displaced due to the project activity in tons CO_2/MWh.

If the same amount of electricity is generated by the coal and gas based power projects, supplying electricity to the regional grid it adds to the emissions that are getting reduced by the project activity. Hence, the baseline calculated using above methods / scenarios would represent the realistic anthropogenic emissions by sources that would occur in absence of the project activity.

Combined margin factor that incorporates 'build margin', takes into consideration the uncertainties expected in the baseline scenario.

2. Emission due to displacement of thermal energy (Fuel oil)

The formula for the estimation of emission due to displacement of thermal energy

Baseline emission due to the displacement of thermal energy (Fuel oil)

= Fuel oil that would have been consumed in FO based boiler (TJ/d) x Emission coefficient of Fuel oil (T C / TJ) x 44/12

The fuel oil consumption would be calculated as follows:

Fuel oil that would have been Consumed in FO based boiler (TJ/d)

= Steam supplied to plant from cogeneration plant (Tons/day) x Enthalpy of steam of cogeneration plant (kJ/kg)/10^6/ FO Boiler efficiency (%)

Whereas FO Boiler efficiency is calculated as

FO Boiler Efficiency (%)

= Steam to Fuel ratio x Enthalpy of steam / Calorific value of Fuel oil

The FO boiler efficiency has been assumed to be 100 % for conservativeness.

Total Baseline emission due to project activity

= Emission due to grid electricity displacement + Emission due to thermal energy displacement

E.1.2.5 Difference between E.1.2.4 and E.1.2.3 represents the emission reductions due to the project activity during a given period:

>>

The emission reduction due to the project activity is estimated by using the following formula:

CO_2 emission reduction due to project activity

= Baseline Emission - Project Emission - Leakage

E.2 Table providing values obtained when applying formulae above:

>>

Emission Reductions

S.No.	Operating Years	Baseline Emissions (Tonnes of CO_2)	Project activity Emissions (Tonnes of CO_2)	Estimation of Leakage (tonnes of CO_2e)	Emission Reductions, (Tonnes of CO_2)
1.	2007-2008	44,820	0	0	44,820
2.	2008-2009	44,820	0	0	44,820
3.	2009-2010	44,820	0	0	44,820
4.	2010-2011	44,820	0	0	44,820
5.	2011-2012	44,820	0	0	44,820
6.	2012-2013	44,820	0	0	44,820
7.	2013-2014	44,820	0	0	44,820
8.	2014-2015	44,820	0	0	44,820
9.	2015-2016	44,820	0	0	44,820
10	2016-2017	44,820	0	0	44,820
	Total	448,200	0	0	448,200

Due to this project activity, there will be emission reduction of 448,200 tonnes of CO_2 during the ten year crediting period.

SECTION F.: Environmental impacts:

F.1. If required by the host Party, documentation on the analysis of the environmental impacts of the project activity:

>>

The project does not fall under the purview of Environment Impact Assessment notification[5] S.O. 60 (E) of the Ministry of Environment and Forest, Government of India, since it is not listed in schedule-I of notification.

The project activity is 5 MW rice husk fired cogeneration plant. The CO_2 emission due to the combustion of rice husk is neutralized by the photosynthesis process of paddy crops. Hence, it "recycles" atmospheric carbon and does not add to the greenhouse effect. And also the rice husk contains negligible quantities of nitrogen and sulphur, hence the other green house gas from the combustion of rice husk can be neglected.

Although the project activity would not cause significant negative impact over the environment, the following measures were considered during the design stage in the purview of environment.

Particulate matter and gases

In order to minimize the dust emission from plant to a level of less than pollution control regulations, electrostatic precipitator is installed for this project. The electrostatic precipitator is designed such that the dust concentration at the ESP outlet would be less than 150 Mg/m^3, even during the plant firing coal and other biomass fuels, in future.

Dry fly ash

Fly ash is collected from the various source points like ESP hoppers, air-heater / economiser hoppers and the ash collected from the furnace are used for land-filling in the nearby regions.

The furnace ash and bank are collected manually by using hand trolleys. The dry fly ash from the economiser, air heater and ESP hoppers is collected through belt conveyors in tractor trolleys and then dumped into the underground ash yard as low lying land filling.

Water Pollution

Acids and alkalis are used as re-generants in the reverse osmosis (RO) plant. The Acid and alkali effluent generated from the regeneration process are drained into a lined underground neutralizing pit. These effluents are neutralized by addition of either acid or alkali to achieve the required pH of about 7.0. Then, the effluents are pumped to the effluent treatment ponds which form part of the cogeneration power plant's effluent disposal system. The rejects from RO plant has high TDS which would be diluted and used for cleaning purposes, ash quenching and plantation.

Chlorine in cooling water

At the condenser outlet, residual chlorine of about 0.2 ppm is maintained in the condenser cooling water. To prevent biological growth in the cooling tower system, the chlorine dosing is provided. This addition of chlorine a not result in any chemical pollution of water and also meets the national standards for the liquid effluent.

Sewage from various buildings in the plant

In the power plant area, sewage from various buildings is conveyed through separate drains. It is collected in septic tank and disposed in soil through trenches. Due to this, there is no ground pollution because of leaching. Sludge is removed occasionally and disposed off as land fill at suitable places.

Thermal Pollution

The power plant has close circuit cooling water system to eliminate the letting out of high temperature water into the canals. Blow down from the cooling tower is conveyed to the drainage through trenches. Therefore, there is no separate pollution due to blow down from cooling water system.

Noise Pollution

As per the Occupational Safety and Health Administration (OHSAS) Standards, the noise level should not exceed 85 to 90 db (A). The rotating equipment in the power plant is supplied with silencers wherever required to meet this standard.

SECTION G. Stakeholders' comments:

G.1. Brief description of how comments by local stakeholders have been invited and compiled:

>>
The local stakeholder comment invitation and compilation process involved is as follows:

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[5] Reference : http://envfor.nic.in/legis/eia/so-60(e).html

The local stakeholders are those who face the immediate effect due to the project activities which involves effect on the local environment, social life and economics. They can be within the boundaries of the village, district, state or nation.

On deciding above criteria for qualification of the stakeholders, the idea was to decide the most appropriate representatives who are covering above. The stakeholders were identified as:

1. Industrial Associates
2. Local Community
3. Punjab state pollution control board
4. Consultants
5. Equipment suppliers

M/s NIEL organised a stakeholder consultation meeting in the NIEL industrial premises with Lalru industrial associates and village people. M/s NIEL presented the nature of the project and its environmental and social impacts to the stakeholders. The issues and concerns of the local villagers were clarified and explained.

G.2. Summary of the comments received:

>>

Stakeholders Involvement

Industrial Associates: Industrial Associates at Lalru had not shown any apprehension about the project activity.

Local Community Local populace was also consulted. They responded positively about this project activity during the consultation meeting and wished the successful operation of the project. The representatives of village panchayat even sent a letter appreciating the initiative by NIEL.

Punjab State Pollution Control Board (PSPCB): NIEL has obtained the 'NOC' from PSPCB for this project activity.

Consultants: Consultants were involved in the project activity at various stages. They had performed the various pre contract and post contract activities like preparation of basic and detailed engineering documents, preparation of tender documents, selection of vendors / suppliers, supervision of project operation, implementation, successful commissioning and trial run.

Equipment suppliers: The equipments were supplied by the equipment supplier as per the specifications finalized for the project activity.

In summary, stakeholders had not raised any concern over this project activity.

G.3. Report on how due account was taken of any comments received:

>>

There was no major comment raised by the stakeholders regarding this project and no adverse comments have been raised.

Annex 1

CONTACT INFORMATION ON PARTICIPANTS IN THE PROJECT ACTIVITY

Organization:	Nahar Industrial Enterprises Limited
Street/P.O.Box:	21st Milestone Ambala-Chandigarh Road. Vill. Jalalpur, P.O. Dappar Distt: Mohali (Near Lalru)
Building:	--
City:	
State/Region:	Punjab
Postfix/ZIP:	140 506
Country:	India
Telephone:	91-1762-506502
FAX:	91-1762-506501
E-Mail:	ssaich@owmnahar.com
URL:	www.owmnahar.com
Represented by:	Mr. S.S. Aich
Title:	Chief Executive
Salutation:	Mr.
Last Name:	Aich
Middle Name:	S
First Name:	S
Department:	-
Mobile:	09316087744
Direct FAX:	-
Direct tel:	-
Personal E-Mail:	

Annex 2

INFORMATION REGARDING PUBLIC FUNDING

No public funding as part of project financing from parties included in Annex I of the convention is involved in the project activity

Annex 3

BASELINE INFORMATION

1. Key elements to determine baseline for power displacement from the grid

Selection of Grid boundary

In the approved consolidated methodology ACM0002, the following guideline is given for the selection of grid. *"Where DNA guidance is not available, in large countries with layered dispatch systems (e.g. state/provincial/regional /national) the regional grid definition should be used. A state/provincial grid definition may indeed in many cases be too narrow given significant electricity trade among states/provinces that might be affected, directly or indirectly, by a CDM project activity".*

As explained earlier in B.1.1, the electrical transmission system in India, is divided into five regions namely Northern Region, North Eastern Region, Eastern Region, Southern Region and Western Region. Northern region grid comprises of Delhi, Punjab, Haryana, Chandigarh, Rajasthan, Jammu & Kashmir, Uttranchal, Uttar Pradesh and Himachal Pradesh. The location of project activity is in Punjab state which is coming under northern region. Therefore northern grid region is selected as grid boundary to estimate the baseline emission factor.

Key elements to determine baseline for the project activity

The following key parameters are used to estimate the baseline emission factor of the project activity:

S No.	Key Parameters	Data Sources	Reference
1	Generation of power of all the plants for the year 2001-02, 2002-03, 2003-04, 2004-05 and 2005-06	Annual reports of Northern Region Load Dispatch Center (NRLDC) 2001-02 and 2002-03 Section 7.1, Annual reports of Northern region Electricity Board (NREB) 2003-04 – Annex-10.1.3 2004-05 – Annexure 2.7 2005-06	http://www.nrldc.org/docs/7-1.pdf http://www.nrldc.org/docs/2001-02-section5onwards.pdf http://nreb.nic.in/Reports/Index.htm
2	Coal consumption of each coal fired power plant for the year 2003-04, 2004-05 and 2005-06	Annual Performance review of Thermal power plant (CEA)	www.cea.nic.in
3	Calorific value of coal	CEA reports	CEA General review 2004-05, CEA report - CO_2 database for power sector, October 2006
4	Calorific value of gas	Revised 2006 IPCC Guidelines	
5	Oxidation factors	Revised 2006 IPCC Guidelines	
6	Efficiency of gas based power	MNES study titled "Baselines for	http://mnes.nic.in/base

	plants supplying power to grid	Renewable Energy Projects under Clean Development Mechanism". Chapter 2,	linepdfs/chapter2.pdf
7	Emission factor of natural gas,	Revised 2006 IPCC Guidelines	Refer Note
8	Emission factor of non-coking coal	CEA report - CO_2 database for power sector, October 2006	http://cea.nic.in/planning/c%20and%20e/Government%20of%20India%20website.htm
9	Emission factor of Eastern and Western grids	CEA report - CO_2 database for power sector, October 2006	http://cea.nic.in/planning/c%20and%20e/Government%20of%20India%20website.htm

Note:

The value of emission factors given in "2006 IPCC Guidelines for national green house gas inventories: Reference Manual and Natcom report is in terms of carbon unit. It is converted in terms of CO_2 as explained below:

Fuel	Emission factor	Emission factor
	tC/TJ	tCO_2/TJ
Natural gas	15.3	56.1 (15.3 x 44/12)
Non-coking coal	26.13	95.8 (26.13 x 44/12)

Power generation Mix of Northern Region for five years

Energy Source	**2001-02**	**2002-03**	**2003-04**	**2004-05**	**2005-06**
Total Power Generation (GWh)	150935	154544	168110	172682	180854
Total Thermal Power Generation	113817	115986	122955	126342	132522
Total Low Cost Power Generation	37117	38559	45154	46339	48332
Thermal % of Total grid generation	75.41	75.05	73.14	73.16	73.28
Low Cost % of Total grid generation	**24.59**	**24.95**	**26.86**	**26.84**	**26.72**
% of Low Cost generation out of Total grid generation - Average of the five most recent years					**25.99**

Generation details

The power generation of power plants falls under Northern grid region for the past three years is given below:

Name	**Type**	**Fuel**	**Generation (2003-04) GWh**	**Generation (2004-05) GWh**	**Generation (2005-06) GWh**
Anta GPS	Thermal	Gas	2775.92	2595.77	2806.84
Auriya GPS	Thermal	Gas	4247.41	4119.47	4281.67
Badarpur TPS	Thermal	Coal	5428.96	5462.78	5380.54
Bairasiul	Hydro	Hydel	687.79	689.67	790.97
Bhakra Complex	Hydro	Hydel	6956.9	4546.01	6838.78
Chamera HPS	Hydro	Hydel	2648.32	3452.25	3833.66
Dadri GPS	Thermal	Gas	5058.66	5527.71	5399.34
Dadri NCTPS	Thermal	Coal	6181.12	6842.52	6768.09
Dehar	Hydro	Hydel	3299.29	3150.52	3122.68
Dhauliganga	Hydro	Hydel	-	-	312.46
Delhi	Thermal	Coal	1164.11	5203.8	1559.10
Delhi	Thermal	Gas	5159.77	4091.37	4046.11
Faridabad GPS	Thermal	Gas	2792.58	3172.01	2954.64
H.P.	Hydro	Hydel	3666.39	3666.39	2870.48
Haryana	Thermal	Coal	6849.26	7192.41	8352.58
Haryana	Hydro	Hydel	251.73	251.73	258.30
J&K	Hydro	Hydel	851.03	851.03	1133.41
J&K	Thermal	Gas	15.41	23.51	28.31
NAPS	Nuclear	Nuclear	2959.44	2760.01	2138.45
Pong	Hydro	Hydel	1178.93	882.57	1730.70
Punjab	Thermal	Coal	14118.96	14390.42	14848.73
Punjab	Hydro	Hydel	4420.43	4420.43	4999.36
Rajasthan	Thermal	Coal	15044.48	17330.79	19903.79
Rajasthan	Thermal	Gas	201.37	360.7	432.58
Rajasthan	Hydro	Hydel	494.07	494.07	921.33
RAPS-A	Nuclear	Nuclear	1293.37	1355.2	1267.50
RAPS-B	Nuclear	Nuclear	2904.68	2954.43	2815.73
Rihand STPS	Thermal	Coal	7949.26	7988.06	10554.73
Salal	Hydro	Hydel	3477.42	3443.29	3480.87
Singrauli STPS	Thermal	Coal	15643.4	15803.34	15502.80
SJVNL	Hydro	Hydel	1537.92	1617.45	3867.12
Tanakpur HPS	Hydro	Hydel	510.99	495.17	483.26
Tanda TPS	Thermal	Coal	2872.81	3254.67	3329.89
U.P.	Thermal	Coal	20638.05	19788.21	19326.44
U.P.	Hydro	Hydel	2063.04	2063.04	1244.92
Unchahar-I TPS	Thermal	Coal	3252.14	3342.83	3544.89

Unchahar-II TPS	Thermal	Coal	3187.93	3438.28	3501.21
Uri HPS	Hydro	Hydel	2873.54	2206.71	2724.81
Uttaranchal	Hydro	Hydel	3452.96	3452.96	3496.87
TOTAL			**168109.8**	**172681.6**	**180853.9**

Calculation of Operating Margin Emission Factor

The following table gives a step by step approach for calculating the Simple Operating Margin emission factor for Northern Regional electricity grid for the most recent 3 years at the time of PDD submission i.e.2003-2004, 2004-2005 & 2005-2006.

	2003-04	**2004-05**	**2005-06**
Generation by Coal out of Total Generation (GWh)	102704.29	106451.00	112572.8
Generation by Gas out of Total Generation (GWh)	20251.12	19890.00	19949.49
Imports from others			
Imports from WREB (GWh)	282.02	1602.84	2153.23
Imports from EREB (GWh)	2334.76	3600.58	4112.67

Fuel 1 : Coal	**2003-04**	**2004-05**	**2005-06**
Avg. Calorific Value of Coal used (kcal/kg)	3820	3820	3624
Coal consumption (tons/yr)	70,397,000	73,279,000	73,279,000
Emission Factor for Coal (tonne CO_2/TJ)	95.8	95.8	95.8
Oxidation Factor of Coal-IPCC standard value	1.0	1.0	1.0
COEF of Coal (tonneCO_2/ton of coal)	1.532	1.532	1.454
Fuel 2 : Gas			
Avg. Efficiency of power generation with gas as a fuel, %	45	45	45
Avg. Calorific Value of Gas used (kcal/kg)	11,464	11,464	11,464
Estimated Gas consumption (tons/yr)	3375955	3315755	3325672.3
Emission Factor for Gas- IPCC standard value(tonne CO_2/TJ)	56.1	56.1	56.1
Oxidation Factor of Gas-IPCC standard value	1.0	1.0	1.0
COEF of Gas(tonneCO_2/ton of gas)	2.693	2.693	2.693
EF (WREB), tCO_2/GWh	880	890	890
EF (EREB), tCO_2/GWh	1050	1040	1040
EF (OM Simple), tCO_2/GWh	**952.98**	**960.85**	**916.99**
Average EF (OM Simple), tCO_2/GWh			**943.60**

List of power plants considered for calculating build margin

During 2005-06, the total power generation in northern grid region was 180,853.94 GWh. Twenty % of total generation is about 36,170.79 GWh. The recently commissioned power plant whose summation of power generation is about 37,608.63 GWh is considered for the calculation of Build margin. The list is tabulated below:

S. No.	**Plant**	**Date of commissioning**	**MW**	**Generation of the unit in 2005-2006 (GWh)**	**Fuel Type**
1	Dhauliganga unit-I	2005-2006	70	78.61	Hydro
2	Dhauliganga unit-II	2005-2006	70	78.61	Hydro

3	Dhauliganga unit-III	2005-2006	70	78.61	Hydro
4	Dhauliganga unit-IV	2005-2006	70	78.61	Hydro
5	Rihand Stage - II unit I	2004-2005	500	2593.70	Coal
6	Panipat # 7	2004-2005	250	921.46	Coal
7	Panipat # 8	2004-2005	250	1613.95	Coal
8	Chamera HEP-II (Unit 1)	2003-2004	100	567.67	Hydro
9	Chamera HEP-II (Unit 2)	2003-2004	100	567.67	Hydro
10	Chamera HEP-II (Unit 3)	2002-2003	100	567.67	Hydro
11	SJVPNL	2003-2004	1500	4104.25	Hydro
12	Baspa-II (Unit 3)	2003-2004	100	389.87	Hydro
13	Suratgarh-III (Unit-5)	2003-2004	250	2033.40	Coal
14	Kota TPS-IV (Unit-6)	2003-2004	195	1695.70	Coal
15	Baspa-II (Unit 1 & 2)	2002-2003	200	779.74	Hydro
16	Pragati CCGT (Unit II)	2002-2003	104.6	728.29	Gas
17	Pragati CCGT (Unit III)	2002-2003	121.2	843.86	Gas
18	Ramgarh CCGT Stage -II (GT-2)	2002-2003	37.5	146.80	Gas
19	Ramgarh CCGT Stage -II (GT-2)	2002-2003	37.8	147.97	Gas
20	Upper Sindh Extn (HPS)(1)	2001-2002	35	68.52	Hydro
21	Suratgarh stage-II (3 & 4)	2001-2002	500	3844.81	Coal
22	Upper Sindh Stage II (2)	2001-2002	35	68.52	Hydro
23	Malana-1 & 2	2001-2002	86	337.79	Hydro
24	Panipat TPS Stage 4 (Unit-6)	2000-2001	210	1688.29	Coal
25	Chenani Stage III (1,2,3)	2000-2001	7.5	3.88	Hydro
26	Ghanvi HPS (2)	2000-2001	22.5	69.71	Hydro
27	RAPP (Unit-4)	2000-2001	220	1432.17	Nuclear
28	Ranjit Sagar (Unit-1,2,3,4)	2000-2001	600	2012.84	Hydro
29	Gumma HPS	2000-2001	3	6.59	Hydro
30	Faridabad CCGT(Unit 1) (NTPC)	2000-2001	144	986.70	Gas
31	Suratgarh TPS 2	1999-2000	250	2112.17	Coal
32	RAPS-B (2)	1999-2000	220	1432.17	Nuclear
33	Uppersindh-2 HPS #1	1999-2000	35	68.52	Hydro
34	Faridabad GPS 1 & 2 (NTPC)	1999-2000	286	1959.71	Gas
35	Unchahar-II TPS #2	1999-2000	210	1732.60	Coal
36	Unchahar-II TPS #1	1998-1999	210	1767.20	Coal

Built Margin Emission Factor is calculated as per the following table:

Considering 20% of Gross Generation		
Sector		
Thermal Coal Based	20003.28	
Thermal Gas Based	4813.33	
Hydro	9927.69	
Nuclear	2864.33	
Total	37608.63	
Built Margin	-	-
Fuel 1 : Coal		
Avg. calorific value of coal used in Northern Grid, kcal/kg		3624
Coal consumption, tons/yr		12952313
Emission factor for Coal,tonne CO_2/TJ		95.8
Oxidation factor of coal (IPCC standard value)		1.0
COEF of coal (tonneCO_2/ton of coal)		1.454
Fuel 2 : Gas		
Avg. efficiency of power generation with gas as a fuel, %		45
Avg. calorific value of gas used, kcal/kg		11464
Estimated gas consumption, tons/yr		802405
Emission factor for Gas (as per standard IPCC value)		56.1
Oxidation factor of gas (IPCC standard value)		1.0
COEF of gas(tonneCO_2/ton of gas)		2.693
EF (BM), tCO_2/GWh		**558.13**

Therefore the **net baseline emission factor** as per combined margin
(OM + BM)/2 = 750.87 tCO_2/GWh

2. Key elements to determine baseline for thermal energy displacement

Estimation of FO Boiler Efficiency

The boiler efficiency is estimated based on the following formula

FO Boiler efficiency is calculated as

FO Boiler Efficiency (%)

= Steam to Fuel ratio x Enthalpy of steam / Calorific value of Fuel oil

The FO boiler efficiency has been assumed to be 100 % for conservativeness.

Estimation of Fuel oil consumption

Fuel oil that would have been Consumed in FO based boiler (TJ/d)

= Steam supplied to plant from cogeneration plant (Tons/day) x Enthalpy of steam of cogeneration plant (kJ/kg)/10^6/ FO Boiler efficiency (%)

Steam supplied to plant is arrived based on the average of January 05 to December 05.

Emission coefficient of Fuel oil

The emission coefficient of fuel oil is referred from "***Revised 1996 IPCC guideline for national GHG inventories***", and it is given as

21.1 TC/TJ

= 21.1 x 44/12

= 77.36 T of CO_2 / TJ

The following table summarises the emission reduction estimation:

Baseline Emission		
Emission due to displacement of electricity		
Power generation from cogeneration plant that would be displacing PSEB	98239	kWh/day
Auxiliary Consumption	11381	kWh/day
Net Generation	86858	kWh/day
Operating Days/year	350	days/yr
Emission factor-Northern Grid	0.751	$kgCO_2/kWh$
Emission due to displace of electricity	22827	tCO_2/yr
Emission due to displacement of thermal energy (Fuel oil)		
Average steam supplied to process from 5 MW Cogeneration plant	12.2	TPH
Enthalpy of steam @ 8 bar abs	2766.2	kJ/kg
	0.03	TJ/hr
Net Calorific value of Fuel oil	40.1900	TJ/KT
Efficiency of FO Boiler	100.000	%
Estimated Fuel energy input	0.03	TJ/hr
Emission factor-Residual Fuel oil	21.1000	Ton C/TJ
Emission factor-Residual Fuel oil	77.3667	Ton CO_2/TJ
Emission due to displace of fuel oil displacement	2.62	Ton CO_2/hr
Emission due to displace of fuel oil displacement	21994	tCO_2/yr
Total Baseline emissions	**44820**	**tCO_2/yr**
Project Emisssions		
Emission due to project activity	0	tCO_2/yr

Leakage		
Leakage due to transportation of biomass	0	tCO_2/yr
Emission Reduction		
Emission reduction due to project activity	**44820**	**tCO_2/yr**
Total CER for ten years crediting period	**448200**	**tCO_2/yr**

Appendix A

Abbreviations

AFBC	Atmospheric Fluidised Bed Combustion
BAU	Business as Usual
BM	Build Margin
CCGT	Combined Cycle Gas Turbine
CDM	Clean Development Mechanism
CEA	Central Electricity Authority
CP	Crediting Period
Db	Decibel
DCS	Distributed Control System
ESP	Electrostatic Precipitator
GHG	Green House Gas
GPS	Gas Power Station
IPCC	Intergovernmental Panel on Climate Change
MCR	Maximum Continuous Rating
MoEF	Ministry of Environment and Forest
MU	Million Units
NIEL	Nahar Industrial Enterprises Limited
NOC	No objection Certificate
NTPC	National Thermal Power Corporation
OM	Operating Margin
OSHA	Occupational Safety and Health Administration
PDD	Project Design Document
PO	Post Office
Ppm	parts per million
PSEB	Punjab state Electricity board
PSPCB	Punjab State Pollution Control Board
QA	Quality Assurance
QC	Quality control
RO	Reverse Osmosis
SJVNL	Satluj Jal Vidyut Nigam
TDS	Total Dissolved Solids
TJ	Tera Joule
TPH	Tonnes per hour
TPS	Thermal Power Station
UNFCCC	United Nation Framework Convention of Climate Change
UP	Uttar Pradesh
